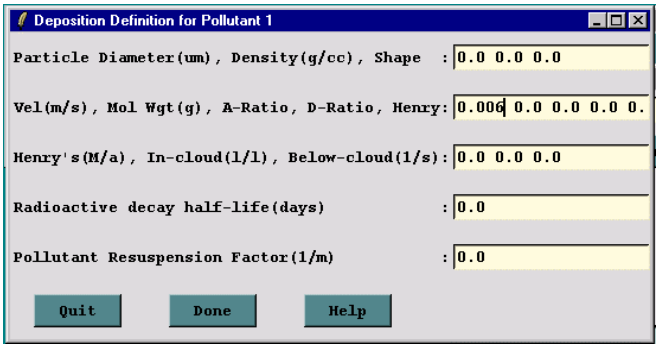
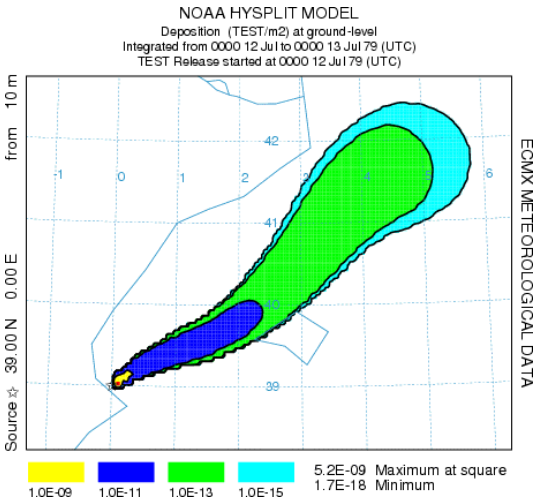
Pollutant Deposition

The deposition (D) from a particle is expressed as a fraction of the mass (m) computed as the sum of different time constants, $D_{wet+dry} = m \{1-\exp[-\Delta t (\beta_{dry}+\beta_{gas}+\beta_{inc}+\beta_{bel})] \}$.

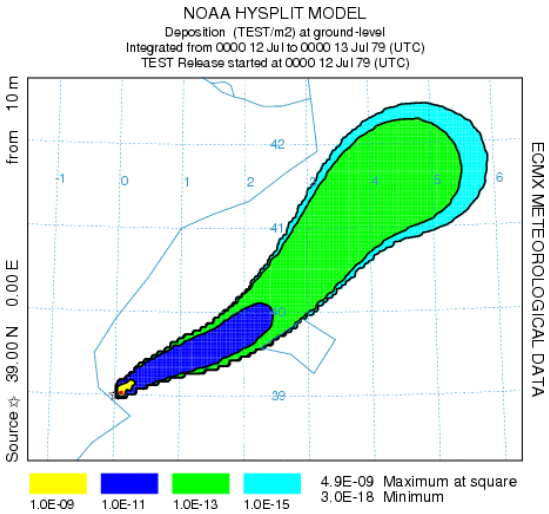
Configure the model to run for 24 hours with default values, from 39N-0W using ECMWF data, releasing one unit over one hour. Set the concentration grid for 0.05 degrees resolution with one output level at zero meters (for deposition). This simulation will yield no results because deposition has not been turned activated. Open up the deposition menu and set the velocity to 0.006 m/s. When entered directly as a velocity (Vd), then $\beta_{dry} = V_d \Delta Z_p^{-1}$. The results show the deposition left by the puff as it moved across the domain.



The dry deposition of particles due to gravitational settling can also be computed from the particle diameter and density: $V_g = d_p^2 g (\rho_g - \rho) (18 \mu)^{-1}$. Enter a density of 5 g/cc and a diameter of 6 um, which should result in a settling velocity close to previous 0.6 cm/s. The results from this configuration are almost identical to the previous calculation.



Deposition Velocity



Settling Velocity

The default approach is for the number of particles and puffs to remain the same but lose mass due to deposition. If the "Deposition Probability" option is selected in the advanced menu, then particles will be lost if $R < \beta_{dry} \Delta t$, and where R is a random number (0-1). The model must be configured for the 3D particles for this option. If a sufficient number of particles are released the results will be identical to the other deposition options.

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